

Notice of Allowability	Application No.	Applicant(s)	
	10/719,351	SCHMIDT, STEPHEN M.	
	Examiner	Art Unit	
	Bernard Rojas	2832	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to ____.
2. ☒ The allowed claim(s) is/are 1-11.
3. ☒ The drawings filed on 21 November 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: ____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date ____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date ____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date ____ |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date <u>03012004</u> | 7. <input type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other ____ |

**UNCOEN DONOVAN
PRIMARY EXAMINER
GROUP 2100**

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement filed 03/01/2004 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Allowable Subject Matter

Claims 1-11 are allowed.

The following is an examiner's statement of reasons for allowance:

Claim 1, the prior art of record does not teach nor suggest, in the claimed combination, a magnetically latched solenoid assembly comprising:

- a housing, said housing supporting;
- a solenoid subassembly and a magnetically latching subassembly laterally spaced from said solenoid subassembly, said solenoid subassembly comprising:
 - an electromagnetic coil, a tubular mandrel supporting said coil and including a through-bore, a moveable armature having at least a portion thereof supported by and longitudinally moveable within said mandrel through-bore and being responsive to electrical energization of said coil;
 - a stationary magnetic pole piece located proximate to one end of said mandrel through-bore;
 - an operating member secured to and arranged for concurrent movement of said armature;
- said magnetic latching subassembly comprising:
 - a magnet holder slidably received by said housing, a magnetic coupling member secured to said operating member and arranged for minimal air gap magnetic latching engagement with said magnet holder upon longitudinal movement of said armature and said operating member;
 - said magnetic latching subassembly further comprising;
 - at least one permanent magnet; and

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biasing means arranged to momentarily prevent impact movement of said coupling member relative to said permanent magnet subassembly resulting from abutting engagement between said movable armature and said stationary pole piece, and for such time that magnetic attraction between said stationary magnet subassembly and said coupling member has reached sufficient force overcome the bias of said biasing member and the magnetic reluctance of said minimal air gap.

Claim 2, the prior art of record does not teach nor suggest, in the claimed combination, a bi-directional solenoid comprising a tubular housing, said housing including;

- first and second axially spaced solenoid assemblies supported by said housing, said solenoid assemblies each comprising an electromagnetic coil and coil supporting mandrel, each of said mandrels containing a through-bore, and a magnetic armature slidably received by a respective mandrel through-bore, and reciprocally moveable operating member secured to each of said armatures and alternatively axially moveable upon movement of a respective armature responsive to electrical energization of a respective one of said coils;

- a stationary magnetic pole piece located intermediate said solenoid subassemblies, and

- a first and a second magnetic latching subassembly, each of said magnetic latching subassemblies being respectively longitudinally spaced from said first and said second solenoid subassemblies;

- each of said magnetic latching subassemblies comprising ;

- a longitudinally moveable permanent magnet subassembly containing at least one permanent magnet,

- a magnetic coupling member arranged for minimal air gap magnetic latching engagement with said longitudinally moveable permanent magnet subassembly upon longitudinal movement of said armature, and

- biasing means arranged to momentarily prevent impact movement of said coupling member relative' to said permanent magnet- subassembly resulting from abutting engagement between said moveable armature and said stationary pole piece, and for such time that magnetic attraction between said longitudinally moveable permanent magnet subassembly and said coupling member has reached sufficient force to overcome the bias of said biasing member and the magnetic reluctance of said minimal air gap.

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Claim 3, the prior art of record does not teach nor suggest, in the claimed combination, a magnetic latching solenoid comprising a housing, said housing containing:

- a solenoid assembly, said solenoid assembly including;
 - a wound electromagnetic coil,
 - a stationary magnetic pole piece,
 - a magnetic armature operated by said coil and movable in a direction towards' said pole piece, and
 - an operating rod secured to and movable with said magnetic armature; and
- a permanent magnetic latching assembly, said magnetic assembly including a permanent magnet latching circuit structure comprising a magnet holder and a permanent magnet secured to and supported by said magnet
 - a magnet coupling member mechanically secured to said solenoid armature and movable therewith and being arranged to magnetically mate with said magnetic latching circuit structure upon abutting contact of said armature with said stationary pole piece, and thereby establish a minimal air gap between said coupling member and said permanent magnet latching structure, and
 - biasing means arranged to bias said coupling member in a direction away from mating contact with said permanent magnet latching structure, and whereby upon achieving abutting contact between said armature and said stationary pole piece, the permanent magnet attraction between said coupling member and said magnetic latching circuit structure is sufficient to overcome the biasing force exerted by said biasing means.

Claim 4, the prior art of record does not teach nor suggest, in the claimed combination, a magnetic latching solenoid comprising:

- a housing, said housing containing;
 - a solenoid assembly, stationary magnetic pole piece laterally spaced from said solenoid assembly and a magnetic latching assembly laterally spaced from said solenoid assembly and from said pole piece;
 - said solenoid assembly including;
 - a nonmagnetic tubular mandrel having bore and having a first and a second end, said first end terminating at and supported by said stationary magnetic pole piece;
 - a bobbin-wound coil positioned circumjacent to and supported by said nonmagnetic tube;
 - a magnetic armature plunger, said plunger being slidably received by the bore of said nonmagnetic tube, said armature plunger having one end normally abutting said magnetic pole piece; and

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an operating rod secured to said armature plunger and extending outwardly of said housing;

said magnetic latching assemblies including;

a magnet retaining subassembly, said subassembly comprising ;

an outer magnet holder supported by said housing and including through bore arranged to receive and secure a middle magnet holder, said middle magnet holder including threaded bore and at least one inwardly facing cavity, at least one permanent magnet disc residing in said cavity, an inner magnet holder abutting said permanent magnet disc and including a through bore, and a threaded clamping screw seated within the bore of said inner magnet holder and threadingly engageable with the threaded bore of said outer magnet holder;

a helical coiled biasing spring having a longitudinal portion surrounding said middle magnet holder, said middle magnet holder and said longitudinal portion being seated within the recessed area of said outer magnet holder, and the remaining longitudinal portion of said biasing spring extending inwardly of said housing;

a magnetic coupling member including a reentrant recessed area arranged to receive the innermost coil of the remaining longitudinal portion of said biasing spring, said coupling member including a flat, inwardly facing surface arranged for abutting contact with the outwardly facing end surface of said armature plunger for cushioning movement of said coupling member against the bias of said coiled spring and with the outwardly facing surface of said coupling member being arranged for magnetic latching contact with the inwardly facing surface of said inner magnet holder, said magnetic coupling member, when in closed latching position relative to said inner magnet holder, providing a substantially zero air gap between said coupling member and said inwardly facing.

Claim 7, the prior art of record does not teach nor suggest, in the claimed combination, a bi-directional dual magnetic latching solenoid comprising a housing, said housing containing:

a stationary magnetic pole piece;

a pair of solenoid assemblies, each of said solenoid assemblies being spaced from opposite sides of said stationary pole piece and each of said solenoid assemblies including;

a wound electromagnetic coil;

a pair of magnetic armatures, each armature of said pair of armatures being operated by a respective one of said coils and being alternatively movable in a direction towards said pole piece; and

an operating rod secured to and alternatively movable with each of said magnetic armatures;

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magnetic armature operated by a respective one of said coils and being movable in a direction towards said pole piece;

an operating rod secured to and alternatively movable with each of said magnetic armatures; and

a magnetic coupling member mechanically secured to a respective one of said pair of said solenoid armatures and movable therewith, said coupling member being arranged to magnetically mate with said magnetic latching circuit structure upon abutting contact of a respective one of said pair of armatures with said stationary pole piece, and thereby establishing minimal air gap between said coupling member and said permanent latching circuit structure; and

biasing means arranged to bias a respective one of said coupling members in a direction away from mating contact with its respective permanent magnet latching structure, and whereby upon achieving abutting contact between a respective one of said armatures and the side of said stationary pole piece, the permanent magnet attraction between said coupling member and its respective magnetic latching circuit structure is sufficient to overcome the biasing force exerted by said biasing means.

Claim 8, the prior art of record does not teach nor suggest, in the claimed combination, a magnetic latching solenoid comprising:

a housing, said housing containing;

a solenoid assembly, a stationary magnetic pole piece axially spaced from said solenoid assembly, and a magnetic latching assembly axially spaced from said solenoid assembly and from said pole piece;

said solenoid assembly including;

a nonmagnetic tubular mandrel having a bore and having first and second end, said first end terminating at and supported by said stationary magnetic pole piece;

an electromagnetic coil positioned circumjacent to and supported by said nonmagnetic tube;

a magnetic armature plunger, said plunger being slidably received by the bore of said nonmagnetic tube, said armature plunger having one end normally abutting said magnetic pole piece; and

an operating rod secured to said armature plunger and extending outwardly of said housing;

a magnetic latching assembly including;

a magnet retaining subassembly, said subassembly

an outer magnet holder supported by said housing and including a through bore arranged to receive and secure a middle magnet holder, said middle magnet holder including a threaded bore and at least one inwardly facing cavity, at least one permanent magnet disc residing in said cavity, an inner magnet holder abutting said permanent magnet disc and including a through bore, and a threaded clamping screw

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seated within the bore of said inner magnet holder and threadingly engageable with the threaded bore of said outer magnet holder;

a helical coiled compression spring having a longitudinal portion surrounding said middle magnet holder, said middle magnet holder and said longitudinal portion being seated within the recessed area of said outer magnet holder, and the remaining longitudinal portion of said spring extending inwardly of said housing;

a magnetic clapper member including reentrant recessed area arranged to receive the innermost coil of the remaining longitudinal portion of said spring, said clapper member including a flat, inwardly facing surface arranged for abutting contact with the outwardly facing end surface of said armature plunger for cushioning movement of said clapper member against the bias of said coiled spring and with the outwardly facing surface of said clapper member being arranged for magnetic latching contact with the inwardly facing surface of said inner magnet holder, said magnet clapper member, when in closed latching position relative to said inner magnet holder, providing a substantially zero gap between said clapper member and said inwardly facing surface.

Claim 10, the prior art of record does not teach nor suggest, in the claimed combination, a magnetic latching solenoid comprising:

a magnetic tubular housing containing a through bore, said housing including;

a solenoid assembly, stationary magnetic pole piece spaced inwardly from said solenoid assembly and a magnetic latching assembly spaced outwardly relative to said solenoid assembly;

said solenoid assembly including;

a magnetic tubular mandrel having bore and extending coaxially relative to said housing bore and having a first and a second end, said first end terminating at and supported by said stationary magnetic pole piece;

a bobbin-wound coil positioned circumjacent to and supported by said non-magnetic tube;

a magnetic armature plunger having a through bore, said plunger being slidably received by the bore of said non-magnetic tube, said armature plunger having one end normally abutting said magnetic pole piece and having its opposite end lying substantially coplanar with the plane intersecting the second end of said non-magnetic tube, said plane being substantially normal to the longitudinal axis of said tubular housing; and

an operating rod slidably received by the bore of said magnetic pole piece and being secured to said armature plunger;

said magnetic latching assembly including;

a permanent magnet retaining subassembly, said subassembly comprising;

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a longitudinally inwardly moveable outer magnet holder slidably supported by said tubular housing and arranged to normally provide a pre-determined axial gap within said housing, said outer magnet holder including a through bore arranged to receive and secure middle magnet holder, said middle magnet holder including a threaded bore and at least one inwardly facing cavity, at least one permanent magnet disc residing in said cavity, an inner magnet holder abutting said permanent magnet disc and including a through bore, and a threaded clamping screw seated within the bore of said inner magnet holder and threadingly engageable with the threaded bore of said outer magnet holder;

a helical coiled compression spring having longitudinal portion surrounding said middle magnet holder, said middle magnet holder and said longitudinal portion being seated within the recessed area of said outer magnet holder, and the remaining longitudinal portion of said compression spring extending inwardly of said housing;

a magnetic clapper member slidably received by the bore of said tubular housing and including a reentrant recessed area receiving the innermost coil the remaining longitudinal portion of said biasing spring, said clapper member including a flat, inwardly facing surface arranged for abutting contact with the outwardly facing end surface of said armature plunger for biasing movement of said clapper member against the bias of said coiled spring, and with the outwardly facing surface of said clapper member arranged for magnetic latching contact with the inwardly facing surface of said inner magnet holder, said magnetic clapper member, when in closed latching position relative to said inner magnet holder, providing a substantially zero air gap between said clapper member and said inwardly facing surface of said inwardly moveable magnet holder.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

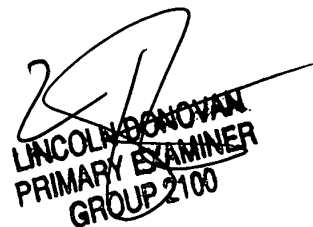
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard Rojas whose telephone number is (571) 272-1998. The examiner can normally be reached on M-F 8-4:00), every other Friday off.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Elvin G. Enad can be reached on (571) 272-1990. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Br


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